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10/617,766	07/14/2003	Jong-Sung Peak	253/027	4047

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LEE & MORSE, P.C.  
3141 FAIRVIEW PARK DRIVE  
SUITE 500  
FALLS CHURCH, VA 22042

EXAMINER
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YUAN, KATHLEEN S

ART UNIT	PAPER NUMBER
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2624

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/617,766

Applicant(s)

PEAK, JONG-SUNG

Examiner

Kathleen S. Yuan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

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### **DETAILED ACTION**

The response received on 3/26/2007 has been placed in the file and was considered by the examiner. An action on the merit follows.

#### ***Response to Amendment***

1. The amendments filed on 26 March 2007 have been fully considered. Response to these amendments is provided below.

#### **Summary of Arguments/Amendments and Examiner's Response:**

2. The applicant has argued that Clunn does not teach deleting image data. However, it is inherent, if not obvious, that by narrowing a search area, image data is deleted since the areas that are not included in the narrowed search areas are deleted.
3. Applicant's arguments with respect to claims 1-4 have been considered but are moot in view of the new ground(s) of rejection.

#### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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6. Claims 1 and 4 claim, "magnifying an alignment mark region of the wafer" and "magnifying the identified key alignment mark." This language is indefinite because it is unclear as to how the actual alignment mark is magnified. The examiner is interpreting the claim to have an image of the key alignment mark as magnified, however, appropriate correction is required.

7. Claim 2 is rejected because of the language "at least about four magnifications." It is unclear what is about four magnifications, and furthermore, what is at least about four magnifications. The language leads the examiner to believe that a magnification fewer than four is applicable to the claim because about four is not equivalent to four, leading to unclear language.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-7 and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4566125 (Clunn) in view of U.S. Patent No. 6295120 (Miyatake).

Regarding claim 1, Clunn discloses a method for recognizing a pattern of an alignment mark on a wafer (col. 1, lines 8-10), the method comprising: positioning the wafer on an adjustable wafer stage in a measurement apparatus (col. 4, lines 49-52); capturing images of a key alignment mark by capturing images in a certain search area

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(fig. 4, item 472 and 478); deleting image data from a region where the alignment pattern does not exist between the captured images by making a smaller search area (fig. 4, item 478), thus deleting the data that in the initial search area (much like a fine position alignment search); and extracting an alignment mark pattern by a pattern recognition of the remaining image data after the deletion of the image data (col. 89, line 58- col. 9, line 32).

Clunn does not disclose expressly capturing images of a key alignment mark by magnifying an alignment mark region of the wafer.

Miyatake discloses capturing images of alignment marks by magnifying the alignment marks by using a higher magnification factor (col. 4, lines 3-5).

Clunn and Miyatake are combinable because they are from the same field of endeavor, i.e. alignment in wafers.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to capture images of alignment marks by magnifying alignment marks.

The suggestion/motivation for doing so would have been to provide a more accurate system by providing an image of alignment with fine detail to allow for fine alignment.

Therefore, it would have been obvious to combine the alignment system of Clunn with magnification of Miyatake to obtain the invention as specified in claim 1.

10. Regarding claim 2, Miyatake disclose that the magnifications made are at least about four magnifications, since a first image from plane 129A (col. 18, line 37) has a magnification factor of 20 (col. 17, lines 24-25) and a second, fine alignment is focused

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on 129B (col. 18, lines 40-41) and has a magnification of 80 to 100 (col. 17, lines 29-30).

11. Regarding claim 3, Clunn discloses a related pattern is recognized during a set-up of the alignment apparatus, by an operator to be the predetermined pattern (col. 8, lines 58-60), for measuring parameters later used in recognition relative to a critical dimension of the pattern, the size (col. 8, line 63).

12. Regarding claim 4, Clunn discloses a method for recognizing a pattern of an alignment mark on a wafer, the method comprising: providing the wafer into a measurement apparatus (col. 4, lines 49-52); identifying a key alignment mark in an alignment mark region of the wafer with a coarse search for alignment (fig. 4, step 472); then having fine alignment step by selecting a smaller search area, an image of only the identified key alignment mark since it narrows the search area of the original area, thus eliminating areas that do not contain the mark (fig. 4, stem 478); extracting an alignment mark pattern by a pattern recognition of the captured image (col. 8, line 58-col. 9, line 32); and establishing the extracted alignment mark pattern as a reference mark (col. 8, line 58-67).

Clunn does not expressly disclose that during a fine alignment step, an image is captured in which the alignment mark is magnified. Miyatake discloses an image is captured in which the alignment mark is magnified (col. 4, lines 3-5).

13. Regarding claim 5, Clunn discloses that the images are captured by the measurement apparatus that includes a controlling member, the controlling member

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being the CPU and memory that controls operations (fig. 2, item 204 and 205 and col. 7, lines 7-9).

14. Regarding claim 6, the controlling member recognizes converted image data via a pattern recognition algorithm, wherein a pattern is recognized (col. 9, lines 8-10), and the controlling member, the CPU, carries out all the programs (col. 7, lines 8-10), and thus carries out the pattern recognition as well.

15. Regarding claim 7, Miyatake discloses a controlling member (fig. 1a, item 30) which controls a driving member, (fig. 1A, item 17) to adjust alignment of the wafer (col. 7, lines 57-60 and col. 4, lines 20-21) in accordance with alignment information (col. 4, lines 19-23). Clunn discloses that alignment information is obtained with the pattern recognition (col. 8, line 58-col. 9, line 32).

16. Claims 13-15 are rejected for the same reasons as claims 5-7. Thus, the arguments analogous to that presented above for claims 5-7 are equally applicable to claims 13-15. Claims 13-15 distinguish from claims 5-7 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

17. Claims 8, 10, 12, 16, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clunn in view of Miyatake, as disclosed by claims 1 and 4 above, and further in view of U.S. Patent No. 6072915 (Tanaka).

Regarding claim 8, Clunn (as modified by Miyatake) discloses all of the claimed elements as set forth above, and incorporated herein by reference.

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Clunn (as modified by Miyatake) does not disclose expressly that image captured is with a CCD sensor.

Tanaka discloses capturing images with a CCD sensor (col. 6, line 37).

Clunn (as modified by Miyatake) and Tanaka are combinable because they are from the same field of endeavor, i.e. imaging of alignment marks.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a CCD sensor.

The suggestion/motivation for doing so would have been to provide a quick and accurate way of representing an image.

Therefore, it would have been obvious to combine the method of Clunn (as modified by Miyatake) with the CCD sensor of Miyatake to obtain the invention as specified in claim 8.

18. Regarding claim 10, Tanaka discloses a box region includes the key alignment mark, as seen in fig. 4A-4E in which a box region contains an alignment mark.

19. Regarding claim 12, Tanaka discloses that a key alignment mark has a square shape with a cross inside (fig. 4B-4E).

20. Claims 16, 18 and 20 are rejected for the same reasons as claims 8, 10 and 12. Thus, the arguments analogous to that presented above for claims 8, 10 and 12 are equally applicable to claims 16, 18 and 20. Claims 16, 18 and 20 distinguish from claims 8, 10 and 12 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.



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21. Claims 9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clunn in view of Miyatake and Tanaka as applied to claims 8 and 16 above, and further in view of U.S. Patent No. 5272763 (Maruyama et al).

Regarding claim 9, Clunn (as modified by Miyatake and Tanaka) discloses all of the claimed elements as set forth above, and incorporated herein by reference. Tanaka further discloses that the CCD sensor transforms incident light with a photoelectric conversion method (col. 4, lines 37-43) into two-dimensional image data as seen in fig.4a-4e.

Clunn (as modified by Miyatake and Tanaka) does not disclose expressly the data is grey-level.

Maruyama et al discloses a CCD camera that captures grey level 2D image data (col. 5, lines 62-69).

Clunn (as modified by Miyatake and Tanaka) and Murayama et al are combinable because they are from the same field of endeavor, i.e. image capture in inspection systems.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have a CCD camera that took grey level data.

The suggestion/motivation for doing so would have been have an efficient faster process since processing of grey level data is simpler and easier to process, thus providing a more efficient system.

Therefore, it would have been obvious to combine the method of Clunn (as modified by Miyatake and Tanaka) with the grey level imaging of Maruyama et al to obtain the invention as specified in claim 9.

22. Claim 17 is rejected for the same reasons as claim 9. Thus, the arguments analogous to that presented above for claim 9 are equally applicable to claim 17. Claim 9 distinguishes from claim 17 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

23. Claims 11 and 19 rejected under 35 U.S.C. 103(a) as being unpatentable over Clunn in view of Miyatake, as applied to claims 1 and 4 above, and further in view of U.S. Patent No. 6278957 (Yasuda et al).

Regarding claim 11, Clunn (as modified by Miyatake) discloses all of the claimed elements as set forth above, and incorporated herein by reference.

Clunn (as modified by Miyatake) does not disclose expressly the key alignment mark has a window frame shape.

Yasuda et al discloses a key alignment mark that has a window frame shape (fig. 6b).

Clunn (as modified by Miyatake) and Yasuda et al are combinable because they are from the same field of endeavor, i.e. alignment.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a window shape pattern for the alignment mark.

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The suggestion/motivation for doing so would have been to provide a more accurate system by providing a specific type of mark that is efficient in a certain type of system (Yasuda et al, col. 22, lines 55-60), thus providing a more robust method.

Therefore, it would have been obvious to combine the method of Clunn (as modified by Miyatake) with the key alignment mark of Yasuda et al to obtain the invention as specified in claim 11.

24. Claim 19 is rejected for the same reasons as claim 11. Thus, the arguments analogous to that presented above for claim 11 are equally applicable to claim 19.

Claim 11 distinguishes from claim 19 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen S. Yuan whose telephone number is (571)272-2902. The examiner can normally be reached on Monday to Thursdays, 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571)272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KY

5/18/2007



JOSEPH MANCUSO  
SUPERVISORY PATENT EXAMINER